PROCEEDINGS

OF THE

CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

VOL. II, PT. II, NO. 17, pp. 311-346, pl. 18, TEXT FIGURES 1-11

December 30, 1920.

EXPEDITION OF THE CALIFORNIA ACADEMY OF SCIENCES TO THE GALAPAGOS ISLANDS, 1905-1906

XVII

DERMAPTERA AND ORTHOPTERA

BY

MORGAN HEBARD

During the years 1905 and 1906, an expedition under the auspices of the California Academy of Sciences visited the Galapagos Islands. One of the members, Mr. F. X. Williams, concentrated his efforts on collecting insects and a considerable series of Orthoptera was secured. This material has been placed in our hands for study, and the results are incorporated in the present paper. Over five hundred specimens have been examined, representing eighteen genera and twenty-eight species and races, of which one is here described as new.

We take the present opportunity to thank most heartily Dr. Barton Warren Evermann, Director of the Museum of the California Academy of Sciences, for enabling us to undertake this task, and Mr. E. P. Van Duzee, Curator of Entomology of that institution, who has not only prepared and shipped the material to us with the greatest care, but has also aided in supplying such field notes as were made.

Dr. R. W. Doane of Leland Stanford Jr. University has also rendered invaluable assistance by sending for examination the most important of the material collected by the Hopkins-Stanford Expedition to the Galapagos. From this material we have been able to select single types for the species described by McNeill, determine their validity, and ascertain their proper generic position.

As this was the tenth scientific expedition to visit these islands, we believe that the Dermaptera and Orthoptera there found are now very well understood. As is usual in insular environment, the number of native species known to occur in the Galapagos is very small in comparison with any continental locality situated on the Equator. One roach, one mantid, eight grasshoppers, four katydids and four crickets comprise the native species. These are, however, of decided interest, as all but one grasshopper, one katydid, and one cricket, are peculiar to this archipelago. Additional interest is found in the fact that the grasshoppers, *Schistocerca literosa* (Walker) and *Halmenus robustus* Scudder, each divides into three distinct geographic races, while the color forms of *Schistocerca melanocera* (Stål) are remarkably intricate, and *Schistocerca intermedia* Snodgrass, is found to be a striking type, evidently annectent between the two other very different appearing species of the genus. One earwig and eight roaches are adventive.

It has long been known that many forms of life found on the Galapagos exhibit a complexity seldom found under natural conditions. Thus in the birds, the genus *Melanospiza* has proved a most difficult and intricate problem. In the Orthoptera we find that we are confronted with racial differentiation only in the two species of grasshoppers noted above.

It is evident that the complexities known to occur in the biota of the Galapagos have led several authors into assuming that far more racial differentiation existed in the Orthoptera than is really the case. We can find no justification for Snodgrass's division of *Sphingonotus* into two species and many races, or of *Schistocerca melanocera* into numerous races. McNeill is similarly at fault in endeavoring to divide his material of the genus *Liparoscelis* into three species.

The present known distribution of Orthoptera in the Galapagos Archipelago is shown by the following table.

		Wenman	Abingdon	Bindloe	Tower	Narborough	Albemarle	James	Jervis	Duncan	Seymour	Indefatigable	Barrington	Chatham	Charles	Gardner	Hood
A	*Euborellia annulipes*	....	....	....	....	....	*	...	....	....	....	....	....	*	....	....	....
A	*Anisopygia snodgrassii*	....	....	....	....	....	*	....	....	....	....	....	....	....	....	....	....
A	*Blattella germanica*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	*
1	*Symploce lita*	....	....	....	....	....	....	....	....	....	....	....	....	*	....	....	....
A	*Leurolestes pallidus*	....	....	....	....	....	....	....	....	....	....	....	....	*	*	....	....
A	*Periplaneta americana*	....	....	....	....	....	....	....	....	....	....	....	....	*	*	....	....
A	*Periplaneta brunnea*	....	....	....	....	....	....	....	....	....	....	....	....	*	....	....	....
A	*Periplaneta australasiæ*	....	....	....	....	....	....	....	....	....	....	....	....	*	*	....	....
A	*Nauphoeta cinerea*	....	....	....	....	....	....	....	....	....	....	....	....	*	*	....	....
A	*Pycnoscelus surinamensis*	....	....	....	....	....	*	....	....	....	....	....	....	*	*	....	....
2	*Galapagia solitaria*	....	....	....	....	....	*	....	....	....	....	*	....	....	....	....	....
3	*Closteridea bauri*	....	....	....	....	....	*	....	....	....	....	....	....	*	....	....	....
4	*Sphingonotus fuscoirroratus*	....	*	....	....	*	*	*	....	....	*	*	*	*	*	*	*
5	*Schistocerca melanocera*	....	*	*	....	*	*	*	*	*	*	*	*	*	*	*	....
6	*Schistocerca intermedia*	....	....	....	....	....	....	....	....	*	....	....	....	....	....	....	....
7	*Schistocerca literosa literosa*	....	....	....	....	....	....	....	....	....	....	....	....	*	....	....	....
7a	*Schistocerca literosa punctata*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	*	*
7b	*Schistocerca literosa hyalina*	....	....	....	*	....	....	....	....	....	....	....	....	....	....	....	....
8	*Halmenus robustus robustus*	....	....	....	....	....	....	*	....	....	....	*	....	....	....	....	....
8a	*Halmenus robustus cuspidatus*	....	....	....	....	....	*	....	....	....	....	....	....	....	....	....	....
8b	*Halmenus robustus choristopterus*	....	....	....	....	....	....	....	....	....	....	....	....	....	*	....	....
9	*Halmenus eschatus*	*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
10	*Desmopleura concinna*	....	....	....	....	....	....	*	....	....	....	....	....	....	....	....	....
11	*Anaulocomera darwinii*	....	....	....	....	....	....	*	....	....	....	*	....	*	....	....	....
12	*Liparoscelis cooksonii*	....	....	....	....	....	*	*	....	....	....	*	*	....	*	....	*
13	*Neoconocephalus triops*	....	....	....	....	....	....	....	....	....	....	....	....	*	....	....	....
14	*Conocephalus exitiosus*	....	....	....	....	....	....	*	....	....	....	*	....	....	....	....	....
15	*Gryllus assimilis*	....	....	*	*	*	....	*	....	....	....	*	....	*	*	....	*
16	*Hygronemobius speculi*	....	....	....	....	....	....	*	....	....	....	....	....	....	....	....	....
17	*Cryptoptilum erraticum*	....	*	....	....	*	....	*	....	....	....	....	....	....	*	....	*
18	*Cryptoptilum lepismoide*	....	....	....	....	....	....	*	....	....	....	....	....	....	....	....	....

The adventive species are marked "A", instead of being numbered.

The material here studied belongs to the California Academy of Sciences, with the exception of a duplicate series which the Academy has kindly permitted the author to retain.

For a description of the islands and for excellent photographs showing the various types of vegetation, we would refer to the account published by Alexander Agassiz[1].

Dermaptera

A single species of Dermaptera, *Euborellia annulipes* (Lucas), has been found adventive in the Galapagos Islands. It is widely distributed through the tropics of America and has been introduced as far north as Philadelphia, Pennsylvania, in the United States, and as Paris, France. The species is not represented in the present collections.

[1] Bull. Mus. Comp. Zool., XXIII, pp. 1 to 89, pls. I to XXII, (1892).

BLATTIDÆ

Nine valid species of Blattidæ are now known from the Galapagos Islands. All but one are adventive forms, domiciliary or adapted to thrive about the habitations of man.

PSEUDOMOPINÆ

Anisopygia Saussure

1893. *Anisopygia* Saussure, Soc. Ent. Zurich, VIII, p. 57.

From a consideration of the description and figures of *jocosiclunis* Saussure, genotype of *Anisopygia,* described from Guatemala, we believe that *Temnopteryx snodgrassii* McNeill, the only known native species of the Blattidæ found in the Galapagos, should be assigned to the same genus.

The following features are shown by *snodgrassii* and are shared by *jocosiclunis* so far as we are able to determine from the literature. We believe that all will be found to be diagnostic for *Anisopygia.*

Interocular space very wide. Tegmina greatly reduced but with sutural margins overlapping, anal sulcus obsolete. Wings greatly reduced. Dorsal surface of male abdomen with caudal margin of penultimate tergite very deeply concave, supra-anal plate very strongly and deeply fissate. Ventro-cephalic margin of cephalic femora with a row of spines which decrease suddenly in size mesad, those distad being piliform, terminating in three heavy distal spines. Pulvilli and arolia present, the former on all four proximal tarsal joints. Tarsal claws symmetrical and unspecialized.

From the above it will be noted that the position of this genus is near *Chromatonotus* Hebard.

To this genus the Mexican species *limbata* and *sumichrasti,* described by Saussure[2] as members of the genus *Temnopteryx,* show close affinity. The character of the dorsal portion of the male abdomen, at least as described for *limbata,* would appear to indicate that they belong, however, to a distinct though closely related genus. Females of *limbata* are in the Hebard Collection, but without males we are not able to make a definite generic assignment.

---

[2] 1868. Rev. et Mag. Zool., (2), XX, pp. 97 and 98.

1. **Anisopygia snodgrassii** (McNeill)

1901. *Temnopteryx snodgrassii* McNeill, Proc. Wash. Acad. Sci., III, p. 493, figs. 35 to 37. [♂, ♀, juv.; Albemarle Island, Galapagos Islands.]

The present insect is readily distinguished from *jocosiclunis,* as well as from the Mexican species we have discussed above, by its solid coloration, nearly rectangulate tegmina with angles rounded and distinctive specialization of the male supra-anal plate.

It appears that McNeill had five specimens before him at the time of original description, though at the end of his diagnosis the adult male was not recorded. The series now before us includes one adult male, so recently emerged that it had not become chitinized, one adult female and three immature females, all taken on Albemarle Island, June 9, 1899. We here select the adult female as single type, the adult male as allotype; both the property of the Leland Stanford Junior University.

McNeill's figure 37 is extremely sketchy and inaccurate. We have consequently given an outline of the distal portion of the abdomen in this male, figure 1.

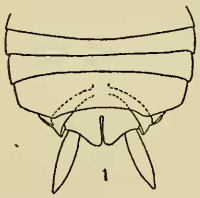


Fig. 1.—*Anisopygia snodgrassii* (McNeill). Dorsal outline of distal portion of male abdomen. *Allotype.* Albemarle Island, Galapagos Islands. (X 6)

2. **Blattella germanica** (Linnæus)

1767. [*Blatta*] *germanica* Linnæus, Syst. Nat., ed. XII, I, p. 668. [Denmark.]

Hood Island, June 1, 1906, 1 ♀.

This cosmopolitan domiciliary species has become widely established through North and South America.

3. **Symploce lita** Hebard

1916. *Symploce lita* Hebard, Trans. Am. Ent. Soc., XLII, p. 357, pl. XVII, fig. 8, pl. XVIII, figs. 1 to 4. [♂, ♀ ; Key West, Florida; Vera Cruz and San Jose del Cabo, Mexico.]

Chatham Island, October, 1905, 1 ♂.

We have stated that this domiciliary species is probably widely distributed through the North American tropics. The specimen here recorded is the first to be found south of Mexico.

Epilamprinæ

4. Leucophaea[illegible]estes pallidus (Brunner)

1865. *Nauphoeta pallida* Brunner, Nouv. Syst. Blatt., p. 286. [Cuba.]

Chatham Island, January, 1906, 1 ♀.

The present domiciliary species has been widely distributed through the American tropics. It is also known from Teneriffe, Canary Islands.

Blattinæ

5. **Periplaneta brunnea** Burmeister

1838. *P*[*eriplaneta*] *brunnea* Burmeister, Handb. Ent., II, Abth. II, pt. I, p. 503. [♂, ♀ ; Chile; Demerara [=British Guiana].]

Chatham Island, January, 1906, 1 ♀.

This is a circumtropical domiciliary insect, the most abundant of the species of *Periplaneta* in tropical America.

6. **Periplaneta australasiæ** (Fabricius)

1775. [*Blatta*] *australasiæ* Fabricius, Syst. Ent., p. 271. ["In nave e mare pacifico et regionibus incognitis revertente".]

Chatham Island, October, 1905, January, 1906, 1 ♀ ; and Charles Island, October, 1905, 3 ♂, 6 ♀.

This domiciliary species is likewise circumtropical in distribution. When encountered, *australasiæ* is usually found in very large numbers.

Panchlorinæ

7. **Pycnoscelus surinamensis** (Linnæus)

1767. [*Blatta*] *surinamensis* Linnæus, Syst. Nat., Ed. XII, p. 687. [Surinam.]

Villamil, Albemarle Island, 1 ♀ ; Chatham Island, October, 1905, 3 ♂, 3 juv. ♀ ; and Charles Island, October, 1905, 1 juv. ♀.

This circumtropical species, which thrives in the vicinity of human habitations, appears to be parthenogenetic in the Americas. The smallest immatures here recorded have the subgenital plate bearing styles; the brief cleft meso-distad, however, determines the sex with certainty.

8. **Nauphoeta cinerea** (Olivier)

1789. *Blatta cinerea* Olivier, Encycl. Method., Ins., IV, p. 314. [Adults and juv.; L'ile de France [=Mauritius].]

Chatham Island, October, 1905, 3 ♂, 4 ♀, 3 juv.; and Charles Island, October, 1905, 6 ♂, 8 ♀, 3 juv.

This is a circumtropical domiciliary species. Immatures are very differently colored than the adults, particularly the head which is dark and unicolorous, with pale mouthparts. Adults from the Galapagos have been recorded by Bruner as the synonymous *bivittata* and by Scudder correctly. Immatures were, however, recorded from these islands as *Nauphoeta lævigata* by Bruner and as *Nauphoeta circumvagans* by Scudder, as material before us from the United States National Museum shows.

Mantidæ

A single species of Mantid is known from the Galapagos and is peculiar to these islands.

9. **Galapagia solitaria** Scudder

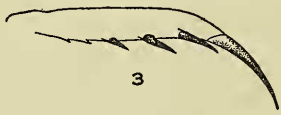
1893. *Galapagia solitaria* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 8, pl. 1, figs. 2 and 3. [♂, ♀ ; South Albemarle Island, Galapagos Islands.]

San Tomas, Albemarle Island, 1200 feet, September, 1906, 1 ♂, and Cormorant Bay, Charles Island, October, 1905, 1 juv. ♂.

This genus and species is of particular interest, due to the fact that though a member of Giglio-Tos' eighth subfamily, the Parathespinæ, it is aberrant in certain features showing some divergence toward the eleventh subfamily, Oligonicinæ, of Giglio-Tos. The reduction in the number of cephalic tibial spines and decided production of the juxta-ocular portions of the vertex are the features of particular interest. Though the cephalic tibiæ bear no dorsal spines, as characteristic of the Oligonicinæ, *Galapagia* bears to *Oligonyx* a decidedly close general superficial resemblance, as well as showing the features mentioned above.

We figure the cephalic tibia and head, as these portions are poorly represented in the figures given by Scudder. We would note that the limb armament is as follows in the present material. Cephalic femur with four discoidal and four not very elongate spines on the ventro-external margin, ventro-internal margin armed with eight spines, IIIIIIII, of which the first two large spines are obliquely placed. A minute genicular spine is found on but one of the internal genicular lobes of the cephalic femora in the adult male, but an indication of such spination is shown on all of these portions in the immature example. The cephalic tibia has the ventro-external margin armed with two large spines, placed distad; the ventro-internal margin with two minute spinulæ proximad and three large spines distad. The unguicular sulcus of the cephalic femora is suffused and very dark.

2



3

Fig. 2.—*Galapagia solitaria* Scudder. Cephalic aspect of head. Male. San Tomas, Albemarle Island, Galapagos Islands. (X 6)

Fig. 3.—*Galapagia solitaria* Scudder. Internal aspect of cephalic tibia. Male. San Tomas, Albemarle Island, Galapagos Islands. (X 13)

Phasmidæ

No walking-sticks have been found in the Galapagos Islands.

Acrididæ

Eight native species of grasshoppers occur on the Galapagos. Two of these each divide into three geographic races. Of these species, but one is known from the mainland. That species is *Sphingonotus fuscoirroratus* (Stål.), recorded also from the island of Puna, in the harbor of Guayaquil, Ecuador.

Acridinæ (Truxalinæ of authors)

10. **Closteridea bauri** Scudder

1893. *Closteridea bauri* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 9, pl. I, figs. 4 and 5. [♀ ; Wreck Bay, Chatham Island, Galapagos Islands.]

Cowley Mountain, Albemarle Island, August 9 to 13, 1906, 1 ♂.

The male sex of this remarkable species differs from the female[3] in its smaller size, slightly more rugose surface, more convex occiput and very slightly less produced but more declivent vertex. The cerci are short, moderately stout, blunt. The subgenital plate is very small, conical, with apex blunt and somewhat transverse when seen from above. The preceding ventral abdominal segment is broadly obtuse-angulate produced, with apex broadly rounded and fitting into base of the subgenital plate.

Coloration. The specimen before us is evidently intensively colored. Occiput clay-color, weakly washed with cinnamon-brown mesad and more heavily so laterad near the eyes; vertex clay-color; other portions of head clay-color, heavily and irregularly overlaid with mummy-brown, with a broad post-ocular bar almost solidly mummy-brown. Eyes dresden-brown. Antennæ clay-color, overlaid with mummy-brown, this very irregularly greater on the alternating joints, giving the antennæ an irregularly annulate appearance. Pronotum dorsad,

[3] Comparison with Scudder's apparently excellent figures is made.

in very narrow area between lateral carinæ of prozona and mesozona, and in very broadly expanding area of metazona clay-color, this portion of the metazona showing a pair of triangular spots of mummy-brown and caudal margin flecked rather closely and heavily with the same. Remaining lateral portions of pronotum mummy-brown, the raised portions over a large area ventro-caudad and feebly dorso-cephalad, marbled with clay-color. Abdomen with dorsal surface light cinnamon-brown, the mesonotum, metanotum, and first abdominal segment broadly dark laterad, warm sepia, so that the pale dorsal portion reaches the caudal margin of the pronotum in a bluntly V-shaped area; third and fourth, and succeeding segments to a lesser degree, with paired depressed areas of warm sepia: ventral surface argus-brown, flecked in scattered, irregular, minute depressions with blackish brown. Cephalic and median limbs clay-color, heavily and irregularly overlaid with mummy-brown. Caudal femora cinnamon-buff, suffused proximad and distad, and with two broad, irregularly margined, transverse bands of warm sepia. Caudal tibiæ olive-buff, genicular area suffused with mummy-brown, particularly on the internal face, a broad meso-proximal bar and distal fourth of tibiæ similarly suffused with mummy-brown, distal half of spines chestnut-brown.

Length of body 20.; greatest width of body (across caudal margin of pronotum) 5.8; length of pronotum 4.3; length of tegmen .3[4]; length of caudal femur 11.; width of caudal femur 3.4 mm.

Œdipodinæ

11. Sphingonotus fuscoirroratus (Stål)

1860. *Œdipoda fuscoirrorata* Stål, Kongl. Svenska Freg. Eugenies Resa, II, Zool., I, Ins., p. 345. [♀: [probably Charles Island], Galapagos Islands; [Island of] Puna, Ecuador.]

1902. *Sphingonotus trinesiotis* Snodgrass, Proc. Wash. Acad. Sci., IV, p. 439. [♂, ♀; Chatham, Indefatigable, Seymour and Albemarle islands, Galapagos Islands.]

[4] The dextral tegmen is concealed; the length given is for the exposed portion of the sinistral tegmen.

1902. *Sphingonotus tetranesiotis* Snodgrass, Proc. Wash. Acad. Sci., IV, p. 444. [♂, ♀; Charles, Barrington, Hood, Indefatigable and Seymour islands, Galapagos Islands.]

We here select the type locality of *fuscoirroratus* as the Galapagos Islands.

The two synonyms erected by Snodgrass were based partly on probably genetic color factors, partly on features of coloration showing only as much individual variation as is well known to occur in many species which are members of the group to which *Sphingonotus* belongs.

Ignorance of these facts might explain such action, but the erection of seven additional subspecies, based on Galapagos material, is inexcusable. Less striking features of the same character were used by Snodgrass as foundation for such action.

In the large series now at hand, every combination and transition between these features is found. We do not feel that it is necessary to give further space for the discussion of these, as such characters in this group have long been known to have no importance from a specific diagnostic point of view. We would note, however, that generally in the genera related to *Trimerotropis,* a number of clearly defined, probably genetic, patterns run through many species, while the immediate environment has a strong effect on the color and degree of intensification and recession of the color-pattern of individuals.

In the present species a strong response to local environmental conditions is clearly developed in the coloration and intensification and recession of the color-pattern, and, as a result, some series before us show a certain amount of uniformity in these respects. From the viewpoint of an elaborate study of the individual variations in this species, with the immediate environmental conditions and probably genetic factors taken into consideration, Snodgrass might have secured some data of interest; but from the standpoint of nomenclatorial stability and systematic research the work under consideration is one of synonyms are: for *trinesiotis—chathamensis, indefatigabilensis* the most unfortunate found in recent literature. The subspecific and *albemarlensis;* for *tetranesiotis—charlesensis, barringtonensis, hoodensis* and (again!) *indefatigabilensis.*

In the present series we would note that the material from Hood Island and the adjacent Gardner Island averages darker in general coloration, with tegminal bars more weakly indicated, than in material from the other islands. In addition, a very conspicuous, probably genetic, factor is developed in four males and one female from Hood Island, in which the pronotal disk and dorsal fields of the tegmina are margined laterally, narrowly and very conspicuously, with light buff.

The series containing the majority of the most contrastingly colored individuals, with tegminal bands very decided, is from Barrington Island. The most contrastingly colored individual, however, comes from Abingdon Island.

The caudal femora are, in the present series, pale, have the distal third suffused, have this suffusion and an additional broad meso-proximal annulus, or have all but the proximal portion suffused. These types all intergrade and are clearly due to recession or intensification of the color pattern.

Distinct difference in the width of the vertex is found, particularly in the male sex. No geographic correlation appears to exist and we believe the difference found, though much more decided than is usual within a species, to be best considered another feature of the striking individual variation exhibited by *fuscoirroratus.*

Specimens examined: 132; 52 males, 75 females and 5 immature individuals.

Abingdon Island, September, 1906, (small immatures seen here and there; adults rare and going pretty well up the mountain), 2 ♂, 2 ♀; Narborough Island, April, 15, 1906, 3 ♂, 1 ♀; Banks Bay, Albemarle Island, April, 1906, (common), 2 ♀; Villamil, Albemarle Island, (common), 2 ♂; Cowley Mountain, Albemarle Island, August 9 to 13, 1906, (very common from shore up to 1100 feet, and perhaps higher), 11 ♂, 30 ♀, 4 immature ♀; James Island, December 21, 1905 to January 5, 1906, 2 ♂; South Seymour Island, March, 1 ♂; Academy Bay, Seymour Island, July, 1906, (fairly common in more sandy spots), 2 ♂, 1 ♀; Barrington Island, October, 1905, (rare), 8 ♂, 7 ♀; Chatham Island, January, April, July and October, 1905 and 1906, (at Wreck Bay taken at light at night on beach), 6 ♀; Charles Island, February, May, June and October, 1905 and 1906, (at Cormorant Bay, common up to 800 feet),

5 ♂, 12 ♀, 1 juv.; Gardner Island, June, 1906, 1 ♂, 2 ♀; and Hood Island, June, 1906, 15 ♂, 12 ♀.

Locustinæ (Acridiinæ of authors)

12. Schistocerca melanocera (Stål)

(Plate 18, figures 1 to 5)

1861. *Acridium melanocerum* Stål, Kongl. Svenska Freg. Eugenies Resa, II, Zool., I, Ins., p. 326. [♀; [probably Charles Island], Galapagos Islands.]

We find the systematic treatment by Snodgrass[5] of this brilliant and beautiful species to be nearly as bad as for *Sphingonotus fuscoirroratus* (Stål). That author divided the species into five races, naming four as follows: *m. minor, m. pallida, m. lineata* and *m. immaculata.* These are based on features of size and color variation, wholly unworthy of nominal recognition and are here unreservedly assigned to synonymy.

In size, material from certain islands shows a different average from material from other islands. This is of interest in studying differences in environmental conditions and in studying the lines followed by the species in becoming distributed through the islands. It is of no specific or racial diagnostic value, as similar size variation is found in many other species of the genus, in none being worthy of nominal designation, hence *m. minor* falls. Color recession explains and disposes of the type named *m. pallida.* A distinct pale line bordering the ventral margins of the dorsal abdominal segments, an interesting feature of color development, but of no taxonomic value, was used as the main reason for proposing *m. lineata.* The series at hand shows this condition as follows: Tagus Cove, Albemarle Island 1 ♂; Villamil, Albemarle Island, 1 ♂. A solidly dark colored prozonal and metazonal portion of the pronotal lateral lobes was used as a basis for *m. immaculata.* This is a color-phase (see plate 18, figure 2), similarly of no taxonomic value and probably genetic in character. The normal condition, showing a spot in this area, is probably the primitive type. The solidly dark phase is represented by the following material; Villamil, Albemarle Island, 1 ♀; James Island, 2 ♂,

[5] Proc. Wash. Acad. Sci., IV, pp. 413 to 425, pl. XXVII, figs. 1, 5 and 6, (1902).

6 ♀ ; South Seymour Island, 2 ♂, 5 ♀ ; Indefatigable Island, 2 ♀ ; Gardener Island, 1 ♀.

Specimens examined: 140; 73 males, 66 females, and 1 immature individual.

Tagus Cove, Albemarle Island, March 22 to April 9, 1906, 2 ♂, 1 ♀ ; Cowley Mountain, Albemarle Island, August, 1906, (common in places, lower levels to sea, especially seen clinging to brush to escape the strong breeze; not thick in green zone up to 1400 feet; very common in grassy districts at about 1800 feet), 10 ♂, 7 ♀ ; Villamil, Albemarle Island, May, 1906, (rather common on roadside; specimens also found at 1400 feet), 3 ♂, 7 ♀ ; James Island, July, 1906, and December, 1905, (near coast), 4 ♂, 10 ♀ ; Jervis Island, December, 1905, (rare and hard to capture), 2 ♂, 2 ♀ ; Duncan Island, August 14, 1906, 2 ♂, 1 ♀[6]; South Seymour Island, November, 1905 (quite common, especially on big lava piles), 2 ♂, 5 ♀ ; Indefatigable Island, November, 1905, 1 ♀ ; Academy Bay, Indefatigable Island, July, 1906, (common on plains near coast), 1 ♀ ; Barrington Island, October, 1905, (not common, found on bare lava streams), 12 ♂, 13 ♀ ; Chatham Island, January and February, 1906, (rather scarce), 5 ♂, 1 juv. ♂ ; Charles Island, October, 1905, (common up to highest point of Island), 31 ♂, 17 ♀ ; and Gardner Island, October 3, 1905, 1 ♀.

13. **Schistocerca intermedia** Snodgrass

(Plate 18, figure 6)

1902. *Schistocerca intermedia* Snodgrass, Proc. Wash. Acad. Sci., IV, p. 431, pl. XXVII, fig. 3. [♀ ; Duncan Island, Galapagos Islands.]

The race described as *i. borealis* by Snodgrass[7], shows no difference of importance from material of this variable species from Duncan Island and is consequently placed in synonymy here.

This insect is one of the most difficult forms of Orthoptera we have ever studied. A single individual blends so remarkably the features of *S. melanocera* (Stål) and of *S.*

[6] These specimens are clearly typical of the present species, though on this island *Schistocerca intermedia* Snodgrass is the dominant type.
[7] Proc. Wash. Acad. Sci., IV, p. 435, pl. XXVII, fig. 2. (1902).

literosa (Walker), that the student might easily imagine he had a hybrid before him. The present large series from Abingdon and Duncan islands shows, however, that this is the dominant type on those islands, typical *melanocera,* however, occurring also on Duncan Island. Snodgrass also reports *intermedia* as the only form found on Bindloe Island, while a specimen from Jervis Island is now before us.

We do not agree with Snodgrass in considering this species absolutely intermediate between *melanocera* and *literosa,* for the larger series now at hand show a distinctly closer affinity to the former species. Individual variability is, however, considerable, and is largely due to the varying degrees of weak infusion of the striking colors and color-pattern developed in *melanocera.*

As the insect here considered represents a type distributed over several islands, and represents a condition combining the features of two distinct types of the same genus found on the same or adjacent islands, the problem as to the proper name designation is most difficult.

Three theories are advanced. 1. The ancestral stock is *intermedia,* and from it have developed two species, *melanocera* and *literosa.* 2. That *melanocera* and *literosa,* having at some time become isolated on one of the islands, interbred and the hybrids, through generations, developed into the species *intermedia.* 3. That *melanocera, intermedia* and *literosa* are descendants from a common ancestor, which became isolated on the various islands of the Galapagos Archipelago and divided into the three species now extant, the ancestral type having disappeared.

We prefer the third hypothesis, though we must admit that the problem is far from being solved[8]. Very similarly puzzling differences are found in some of the birds of the Galapagos.

The species is fully discussed by Snodgrass, the present material showing nothing of additional importance. We do not find *literosa* sufficiently close to *intermedia* to warrant considering the Hood Island race of that species (*l. punctata*), intermediate between the Chatham Island race of that species (*l. literosa*) and the present species, as stated by that author.

[8] Snodgrass offers another hypothesis, i. e., that *intermedia* is a form of *melanocera* varying toward *literosa,* or the opposite. That author prefers the hybridization theory and did not consider the third theory offered here as the probable solution of the problem.

Specimens examined: 39; 19 males and 20 females.

Abingdon Island, September 18 to 23, 1906, (not plentiful, more numerous in barren places, taken at 900 feet), 3 ♂, 1 ♀; James Island, 1 ♂, 1 ♀; and Duncan Island, August 14, 1906, and December 1 to 17, 1905, (common, especially higher up in valley and on summit, found in copulo and flying singly against the wind), 15 ♂, 18 ♀.

14. Schistocerca literosa literosa (Walker)

(Plate 18, figure 7)

1870. *Acridium literosum* Walker, Cat. Dermapt. Saltat. Br. Mus., IV, p. 620. [♂, Galapagos Islands.]

1893. *S*[*chistocerca*] *l*[*iterosa*] *discoidalis* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 16. [♂, ♀; Chatham Island, Galapagos Islands.]

Scudder considered Chatham Island material as a distinct race from typical *literosa,* which race he supposed was peculiar to Charles Island, following Butler, who recorded the species from Charles Island, and whose study was probably based on Walker's type. We follow Snodgrass in placing the race discussed in the synonymy here. Sufficient work has now been done to show that the Darwinian material recorded by Butler was probably incorrectly labelled "Charles Island," as *literosa* is now definitely known to be absent from that island.

Chatham Island, January and February, 1906, and October, 1905, (rather rare), 9 ♂, 5 ♀.

Scudder has given a thorough tabular comparison of the races of this species and Snodgrass has added much valuable information[9]. We would note in addition only that the caudal femora, in the present series, range from dark bluish glaucous to light ochraceous-buff faintly tinged with bluish glaucous. The majority of the series more closely approach dark bluish glaucous.

[9] Proc. Wash. Acad. Sci., IV, pp. 425 to 431, pl. XXVII, fig. 4, (1902).

15. **Schistocerca literosa punctata** Scudder

(Plate 18, figure 8)

1893. *S[chistocerca] l[iterosa] punctata* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 16. [♀ ; Hood Island, Galapagos Islands.]

Hood Island, June and September, 1906, 6♂, 18♀ ; and Gardner Island, January and February, 1906, (common up to summit), 2♂, 1♀.

Though very close to *l. literosa* (Walker), the present race is readily distinguished by the features given by Scudder. It is the largest of the races of this species. The character of the distal fissure of the male subgenital plate, given by Scudder, is shown by the series before us to be variable, exhibiting in all the races the types described by that author. In the present race the caudal tibiæ are colored as described here for *l. literosa.*

16. **Schistocerca literosa hyalina** Scudder

(Plate 18, figure 9)

1893. *S[chistocerca] l[iterosa] hyalina* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 16. [♂, ♀ ; Tower Island, Galapagos Islands.]

Tower Island, IX, 1906, (fairly common), 12♂, 1♀.

This race is also easily separated by Scudder's diagnosis. In size it approximates closely the Chatham Island race, *l. literosa* (Walker). The difference in tegminal coloration is not decided and is principally indicated in the present series by the spots being not quite as much congregated. The caudal femora in the present series are, however, distinctive in being uniform ochraceous-buff, without trace of glaucous.

17. **Halmenus robustus robustus** Scudder

1893. *Halmenus robustus* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 18, pl. I, figs. 6 and 7. [♂, ♀ ; Conway Bay, Indefatigable Island; Indefatigable Island; James Island, all Galapagos Islands.]

Indefatigable Island, July, 1906, (southern part of island, lower edge of green zone at 500 feet), 1♂, 1♀, in coitu.

This pair is more brilliantly colored than any of the other specimens of the races of *robustus* before us. The pale dorsum,

including the tegmina, and dark sides give the female a particularly striking appearance.

This race appears to be best characterized by the vertex, which averages slightly sharper than in the other races and by the tegmina which slightly overlap in both sexes and have their apices rather sharply rounded.

18. **Halmenus robustus choristopterus** Snodgrass

1902. *Halmenus choristopterus* Snodgrass, Proc. Wash. Acad. Sci., IV, p. 450. [♀ ; Charles Island, Galapagos Islands.]

Charles Island, May 30 to June 4, 1906, 1 ♀.

This race is now known from two females. It is apparently very close to *H. robustus cuspidatus* Snodgrass. The female before us, however, has the apical portions of the ovipositor valves strongly curved, much more so than in any of the other females of *Halmenus* at hand, in which these portions are only weakly curved.

The present specimen, though dried alcoholic, was in life clearly very pale in coloration, with tegmina showing a narrow whitish border along their ventral margins and caudal femora having dark areas dorsad in place of bands. The pronotum has a medio-longitudinal carina, weak but distinct, which feature is shown to a like degree in but one female of *r. cuspidatus.*

The lateral angulation of the pronotal disk is distinct though not decided, the caudal margin of the pronotum weakly and bluntly angulate, the tegmina elongate, separated by a brief interval (1. mm.), with apices broadly rounded. In these latter features complete agreement with specimens of *r. cuspidatus* is found.

19. **Halmenus robustus cuspidatus** Snodgrass

1902. *Halmenus cuspidatus* Snodgrass, Proc. Wash. Acad. Sci., IV, p. 450. [♂, ♀ ; Iguana Cove and Tagus Cove, Albemarle Island, Galapagos Islands.]

Tagus Cove, Albemarle Island, 3000 feet, 1 ♂, 1 ♀, in coitu; Cowley Mountain, Albemarle Island, August 9 to 13, 1906, 3 ♂, 5 ♀, 1 juv. ♀ ; Villamil, Albemarle Island, 1200 feet, August 20 to September 5, 1906, 5 ♂, 4 ♀.

This race is decidedly variable. The angle of the vertex is more acute in some individuals than in others. The pronotum has the medio-longitudinal carina usually very weak, particularly in the prozonal and mesozonal portion, which portion is then somewhat swollen, in other individuals it is subobsolete and in one example it is moderately strong. The dorsum of the pronotum rounds into the lateral lobes with scant trace of angulation in some, in others angulation is marked, particularly in the median section. The caudal margin of the pronotum usually shows a blunt angulation, but it is evenly convex in a few examples. The tegmina vary much in length (♂ 3.9–5.2; ♀ 4.7–6.7 mm.), have the apices ranging from broadly rounded to acute and are overlapping (in three males only), or separated by a brief interval in both sexes (♂ attingent to .3; ♀ .5 to 1. mm.)

The color-pattern is weakly to strongly developed in the series, and two striking features, a very pale line on the costal margins of the tegmina and transverse caudal femoral bands, are present or absent in different individuals. In the present series the pale line on the costal margins of the tegmina is very conspicuous in five males and one female, conspicuous in three males and two females, weak in one male and two females, and absent in five females. The majority have the caudal femora immaculate, but variation is shown in all degrees up to one female in which the three dark bars are very heavy.

20. **Halmenus eschatus,**[10] new species

(Plate 18, figures 10 and 11)

1902. *Halmenus* sp. Snodgrass, Proc. Wash. Acad. Sci., IV, p. 451. [From stomach of a mockingbird on Wenman Island, Galapagos Islands.]

The present insect is clearly a derivative from the same stock as *H. robustus* Scudder, the differentiation having reached a much greater degree than in the races of that species here treated, and, in our opinion, warranting its recognition as a full species.

[10] From ἔσχατος=the most remote, in allusion to the fact that this species occurs only on Wenman Island, the most isolated of the Galapagos Archipelago.

When compared with *robustus,* this species is found to be particularly distinguishable by its larger size, much broader interocular space and vertex, tegmina with greatest width meso-distad and separated by a space nearly equalling the tegminal width, and strikingly shorter and heavier caudal femora, which about reach the abdominal apex in males and fail to reach that point in females.

Type: female, No. 717, Mus. Cal. Acad. Sci., Wenman Island, Galapagos Islands; collected late September, 1906, by F. X. Williams.

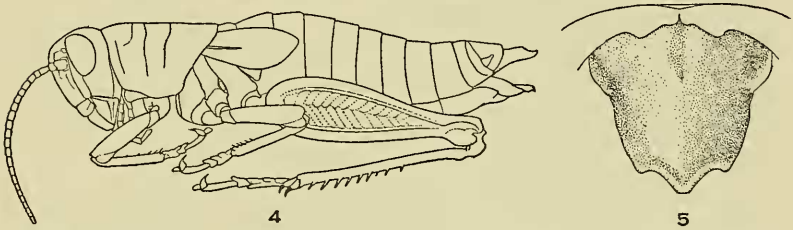
Size large and form moderately robust for the genus. Vertex broad, interocular space broad (1. mm. in width). Fastigio-facial angle blunt, forming an angle of approximately 90°. Pronotum with dorsal portion of prozona and mesozona swollen, transverse sulcus weak but distinct, medio-longitudinal carina weakly indicated on prozona and mesozona, well developed on metazona, caudal margin or disk broadly convex with a very small median angulate emargination. Disk of pronotum scarcely pitted, almost smooth, in prozonal and mesozonal portion, rugose on metazona, this surface less rough than in *robustus.* Tegmina decidedly shorter than pronotum, elongate-ovate, slightly wider meso-distad than proximad, with apices broadly rounded. Tegmina separated by a distance nearly equalling the width of one of the tegmina. Prosternal spine proportionately small, conical. Ovipositor valves with apices moderately curved, intermediate in degree between the types shown by *H. robustus robustus* Scudder and *H. robustus choristopterus* Snodgrass, their internal surfaces similarly plentifully supplied, with rather short, silky hairs. Caudal femora heavy, much heavier and proportionately shorter than in *robustus,* not reaching the apex of the abdomen.

Allotype: Male, No. 718. Mus. Cal. Acad. Sci., Wenman Island, Galapagos Archipelago; collected late in September, 1906, by F. X. Williams.

Size larger and form more robust, as compared with males of *robustus.* Vertex broader and blunter. Pronotum heavier, with dorsal portion of prozona and mesozona moderately swollen, transverse sulcus weak but distinct, medio-longitudinal carina percurrent, well developed, low but heavy and comparatively broadly rounded in transverse section, caudal margin of disk broadly convex with a minute median angulate emargination. Disk of pronotum, tegmina[11] and prosternal spine as described for the female sex. Furcula represented by very briefly produced, transverse projections, with distal margins rounded but indicating some angulation. Supra-anal plate with lateral margins rather strongly convex-convergent proximad for a brief distance to above cerci and in this portion sharply but narrowly reflexed, thence straight and weakly convergent to distal portion, where they are very strongly convergent and weakly concave to the bluntly rounded apex, so that the distal portion of the plate is almost subtruncate. Surface of supra-anal plate showing a short medio-longitudinal sulcus in proximal portion, bounded by carinæ. Cerci heavy, hardly twice as long as proximal width, tapering very weakly to distal

[11] The tegmina, though varying greatly in proportionate length to width, are seen in the series to be always much shorter than the pronotum and separated by a decided interval.

portion, where the margins, particularly the ventral margin, are more decidedly convex-convergent to the rather blunt apex. Subgenital plate small, sharply concave, emarginate at apex, the two apices thus forming two very small, rounded projections. Caudal femora heavy as in female, and, similarly, much heavier and proportionately shorter than in *robustus*, but in this sex only reaching the apex of the abdomen.



4 5

Fig. 4.—*Halmenus eschatus*, new species. Lateral outline of female. *Type*. Wenman Island, Galapagos Islands. (X 2)

Fig. 5.—*Halmenus eschatus*, new species. Dorsal view of male supra-anal plate. *Allotype*. Wenman Island, Galapagos Islands. (Much enlarged.)

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Exposed length of tegmen	Width of tegmen	Least width between tegmina	Length of caudal femur
Allotype	23.	5.8	4.	2.	1.8	11.3
Paratype	23.3	5.2	3.9	1.6	1.7	10.4
Paratype	22.	5.7	3.7	1.8	2.2	11.2
Paratype	20.8	5.9	3.6	1.9	2.	10.9
♀						
Type	32.8	7.9	6.2	3.	2.6	14.5
Paratype	29.	7.1	5.8	2.3	2.6	13.2
Paratype	27.	7.1	5.	2.4	2.4	13.4

The width of the caudal femur in the type is 3.9 millimeters[12]. In the present series this width varies in the males from 3. to 3.2 millimeters, in the females from 3.8 to 4. millimeters.

Coloration of type: Dorsal surface cinnamon-brown. Head with eyes buckthorn-brown, with a moderately broad postocular bar of mummy-brown, margined dorsad narrowly with tawny, occiput and vertex cinnamon-brown, remaining portions of head ochraceous-tawny, flecked with chestnut-brown. Pronotum with dorsum and lateral lobes to impressed area cinnamon-brown, small impressed area smooth, shining, blackish chestnut-brown, bordered ventrad and particularly ventro-caudad with patches of ochraceous-buff, below this the lateral lobes are ochraceous-tawny, flecked with chestnut-brown. Tegmina cinnamon-brown, marbled with mummy-brown. Abdomen cinnamon-brown. Limbs cinnamon-brown, flecked with mummy-brown. Caudal femora with traces of three darker bars on external face, internal portion of dorsal face and internal face ochraceous-tawny, with three distinct dark bands and genicular area mummy-brown. Caudal tibiæ sayal-brown, tinged with drab internally, spines black in distal half.

In general coloration the series before us agrees closely with the type, except that the males have the lateral post-ocular bar

[12] In an average female of *H. robustus cuspidatus* Snodgrass, the caudal femur is 16.6 millimeters in length and 3.4 millimeters in width.

(on the pronotum an extension of the dark marking in the impressed area as described for the type) more apparent, with portions below, and particularly caudad, paler; in one individual broadly buff.

In addition to the type and allotype, a paratypic series of three males and two females, bearing the same data, is before us as well as a female taken from the stomach of a mockingbird on Wenman Island, December 14, 1899.

Tettigoniidæ (Locustidæ of authors)

Four species of katydids are found native on the Galapagos Islands. Of these three are peculiar to the islands, and one is widely distributed over the American continent as well.

Phaneropterinæ

21. **Anaulocomera darwinii** Scudder

1893. *Anaulocomera darwinii* Scudder, Bull. Mus. Comp. Zoöl., XXV, p. 19, pl. III, figs. 1, 4, and 5. [♂, ♀; Chatham Island; Wreck Bay, Chatham Island; Indefatigable Island.]

At 1100 feet, February 22, 1906, (on grass), 1 ♂.

This specimen agrees fully with the type. We would note that the male supra-anal plate is triangular, distinctly longer than its basal width, and has the dorsal surface moderately convex. Meso-ventrad, an elongate, slender shaft (the titillator?) projects from the anal chamber. This shaft reaches half the distance to the furcation of the elongate cerci and shows a weak and even upward curvature to its aciculate chitinous apex.

Pseudophyllinæ

22. **Liparoscelis cooksonii** (Butler)

1877. *Agrœcia cooksonii* Butler, Proc. Zool. Soc. London, 1877, p. 87. [♀; Charles Island; Albemarle Island, both Galapagos Islands.]

1901. *Liparoscelis cooksoni ensifer* McNeill, Proc. Wash. Acad. Sci., III, p. 498, text fig. 39. [♂, ♀; Hood Island, Galapagos Islands.]

1901. *Liparoscelis paludicola* McNeill, Proc. Wash. Acad. Sci., III, p. 499, text fig. 40. [♂, ♀; Albemarle Island, Galapagos Islands.]

1901. *Liparoscelis pallidus* McNeill, Proc. Wash. Acad. Sci., III, p. 500, text fig. 41. [♀; Barrington Island, Galapagos Islands.]

In 1893, Scudder erected the genus *Nesœcia*[13], placing in it the single species here under consideration. In 1895, Brunner, without comment, placed *Nesœcia* as a synonym of *Liparoscelis* Stål[14]. This assignment was followed by McNeill, and is in our opinion correct. Kirby, however, in 1906, has resurrected Scudder's *Nesœcia,* evidently assigning to it the species having smooth faces and limiting *Liparoscelis* to the species having rough faces[15]. This action we believe, from study of the literature and material of three of the four species involved, before us, to be untenable and we consequently place *Nesœcia* Scudder under *Liparoscelis* Stål.

McNeill, in 1901, described two additional species and one race from the Galapagos Islands. Careful consideration of his paper, a pair from the original series of his synonymous *paludicola,* and a large series at hand convinces us that but one species occurs in the Galapagos. It is evident that McNeill was ignorant of the variation which occurs in many species of the Pseudophyllinæ, and the differences described by that author are clearly of no specific diagnostic value.

The species apparently reaches its largest size and develops a conspicuously colored phase in the mangrove (*Avicennia* sp.) swamps. Upon this condition McNeill's *paludicola* was based.

In the present material, the length and degree of curvature of the ovipositor is decidedly variable. In length the tegmina usually slightly exceed the pronotum, frequently are somewhat longer than this and very rarely slightly shorter than the pronotum. The pronotum is distinctly tuberculate, occasional individuals having this slightly less pronounced than is usual.

---

[13] Bull. Mus. Comp. Zool., XXV, p. 20.
[14] Monogr. der Pseudophylliden, p. 174.
[15] Syn. Cat. Orth., II, p. 329.

When compared with material of *L. nigrispina* Stål[16] and Brunner's figure of *L. pallidispina* Stål, the present species is seen to be much less heavily built, with limbs proportionately by no means as robust as in those species and of what may be termed a much more normal type. In all features which we would consider of generic diagnostic importance, however, very close agreement is shown.

The very decided size variation is shown by the following table for the extremes of the present series.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Greatest width of pronotum[17]	Length of tegmen[18]	Length of caudal femur
Cowley Mountain, Albemarle Island	23. –27.8	5. –5.9	4.5–5.9	6.2–8.8	10.2–14.6
San Tomas, Albemarle Island	31.7–32.	6. –6.4	5.9–6.3	7.3–7.8	15. –15.7
Iguana Cove, Albemarle Island	29.	5.5	6.	8.3	12.2
Indefatigable Island	25. –28.	4.8–6.	5.2–5.8	8.5–9.7	12. –14.7
Charles Island	27.	6.3	6.9	8.5	13.8

♀	Length of body[19]	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor[20]
Cowley Mountain, Albemarle Island	26.2–30.5	6. –6.3	7.6–6.8	12.2–17.7	10.7–14.
San Tomas, Albemarle Island	33. –34.	6.8–7.	6.1–7.	17.9–17.7	14. –14.1
Villamil, Albemarle Island	28. –36.	5.9–7.	5.9–7.4	14.1–18.	11.3–14.7
Indefatigable Island	28. –30.5	5.7–6.2	7.9–8.8	13.4–18.4	10.7–12.9
Charles Island	31. –38.	7. –7.3	7.6–7.3	17.1–18.2	12.7–15.
Hood Island	34.	7.1	10.6	19.7	16.

Variation in coloration is decided, some individuals being almost immaculate, many moderately maculate, and a few heavily and conspicuously mottled. The color differences are evidently wholly or in large part attributable to individual response to local environmental influences. The majority of flightless katydids show such signal individual color adaptation to their immediate environment.

Specimens examined: 42; 12 males, 27 females and 3 immature individuals.

Tagus Cove, Albemarle Island, I, 30, 1899, 1 ♂, cotype of *L. paludicola,* [Leland Stanford Jr. Univ.]; Elizabeth Bay, Albemarle Island, II, 25, 1899, 1 ♀, cotype of *L. paludicola,* [Leland Stanford Jr. Univ.]; Cowley Mountain, Albemarle

[16] Four males, taken by Gaumer at Merida, Yucatan, are in the Hebard Collection.
[17] Including the lateral lobes.
[18] Measuring the exposed portion only.
[19] In females of this species the length taken is from the vertex to the abdominal apex, the apex of the subgenital plate falling considerably short of the apex of the abdomen.
[20] We take this measurement as a straight line from the point of emergence of the line of juncture of the valves to the apex. McNeill's method of measuring the arc is difficult, more liable to inaccuracy, and unnecessarily heterodox.

Island, August 7 to 13, 1906, 4 ♂, 9 ♀ ; San Tomas, 1200 feet, south Albemarle Island, October 30, 1905, 2 ♂, 4 ♀, 1 juv.; Iguana Cove, Albemarle Island, 1 ♂, 1 ♀ ; Villamil, Albemarle Island, August 20 to September 5, 1906, 2 ♀ ; Indefatigable Island, October 25 to 28, 1905, November 11 to 20, 1905, 2 ♂, 5 ♀ ; Academy Bay, Indefatigable Island, November 5 to 16, 1905, 1 ♂, 2 ♀ ; Charles Island, May 30 to June 6, 1906, 1 ♂, 1 ♀, 1 small juv.; October, 1905, 1 ♀ ; and Hood Island, June, 1906, 1 ♀, 1 large juv. ♂.

Conocephalinæ

23. **Conocephalus exitiosus** (McNeill)

1901. *Xiphidium exitiosum* McNeill, Proc. Wash, Acad. Sci., III, p. 501, fig. 42. [2 ♂, 3 ♀, 3 juv.; Indefatigable and James islands, Galapagos Islands.)

1915. [*Xiphidium*] *exitiosum* Rehn and Hebard, Trans. Am. Ent. Soc., XLI, p. 235. (No additional material.)

In 1915, at the time the American species of *Conocephalus* were revised, no material of the present species was available for study.

The type series, belonging to the collection of the Leland Stanford Jr. University, is now before us. The specimens from James Island were taken on April 22, 1899, those from Indefatigable Island on May 1, 1899. We here select a male from James Island as type, a female, bearing the same data, as allotype, of this interesting species.

The species is found to belong to the subgenus *Xiphidion* Serville and shows close agreement with *C. nemoralis* (Scudder), a species peculiar to the central-eastern interior of the United States.

The males in general appearance agree rather closely with males of *nemoralis*[21], showing in the cerci, however, a condition in some respects intermediate between the types developed in *nemoralis* and *C. occidentalis* (Morse), the latter a species

[21] The coloration of the present specimens can not be determined, except that the vertex and dorsum of the pronotum are marked with a very broad band of dark brown. McNeill gives green as the general coloration of the species.

of the Pacific coastal portion of the United States. The females are, in general appearance, nearest *occidentalis.*

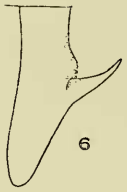


Fig. 6.—*Conocephalus exitiosus* (McNeill). Dorsal view of male cercus. *Type.* James Island, Galapagos Islands. (X 11)

It is of interest to note that, of the many tropical American species of *Conocephalus,* none shows close affinity to *exitiosus.*

The following features are noted in the male type. Caudal tibiæ armed distad with three pairs of spurs. Subgenital plate not produced disto-laterad in sharp spikes, disto-lateral styles small and filiform, the sockets of which are produced beyond the transverse distal margin of the plate. Cerci with mesal portion not contrastingly swollen and with a heavy mesal (in vertical sense) tooth, so that its base is entirely visible from above; distal portion elongate conical, with blunt apex hardly at all depressed[22]. Form moderately robust. Vertex scarcely ascending, fastigium very slightly wider than proximal antennal joint. Eyes normal. Pronotum with lateral lobes considerably longer than deep, ventro-cephalic angle distinct though rounded. Convex callosity vary broad, humeral sinus subobsolete. Abdomen immaculate. Caudal femora rather short, with proximal swollen portion heavy, ventral margins unarmed, genicular lobes not spined[23]. Tegmina much as in *nemoralis,* reduced, covering slightly more than half the dorsal surface of the abdomen, veins heavy, stridulating area large, apex of tegmen rather broadly rounded.

The female allotype shows, in addition, the following diagnostic features. Tegmina slightly more elongate than in male, with apices slightly less broadly rounded. Ovipositor heavy, tapering distad to the acute apex, the shaft showing a very weak upward curvature, its ventral margin being straight in the proximal two-thirds.

---

[22] In form of the cerci, *exitiosus* is seen to be almost intermediate between *nemoralis* and *occidentalis.*

[23] This is the only American species of the genus known to us in which the genicular lobes of the caudal femora are unarmed.

McNeill's figure of a female of this species is sketchy throughout. In particular, the lateral lobes of the pronotum are not sufficiently deep, the angles are too sharp, the curvature of the margins overlooked, particularly the very slight but apparent concavity at the humeral sinus.

Length of body ♂ 13.5, ♀ 14.5; length of pronotum ♂ 3.9, ♀ 4.9; length of tegmen ♂ 6.8, ♀ 7.7; length of caudal femur ♂ 12.4, ♀ 15.8; greatest width of caudal femur ♂ 2.4, ♀ 2.9; length of ovipositor 10.2 mm.

24. **Neoconocephalus triops** (Linnæus)

1758. [*Gryllus (Tettigonia)*] *triops* Linnæus, Syst. Nat. Ed. X, i, p. 430. ["Indies", probably the West Indies.]

1893. *Conocephalus insulanus* Scudder, (not *Conocephalus insulanus* Redtenbacher, 1891), Bull. Mus. Comp. Zoöl., XXV, p. 21, pl. III, figs. 2 and 3.]

1907. *Conocephalus insularum* Karny, Revisio Conocephalidarum, p. 38. (New name for Scudder's preoccupied name.)

This variable species appears to be the cause of a large portion of the confusion and synonymy evident in the literature covering the American species of the genus. The synonyms *obtusus* Burmeister and *dissimilis* Serville have long been established. We have also added *mexicanus* Saussure, *fusco-striatus* Redtenbacher and variety *tibialis* Karny to the present synonymy[24].

In determining the Galapagos species, we have gone over the literature and extensive series of the genus from Colombia, Panama, Central America, the West Indies, and North America. We have found that the Galapagos species is *triops* beyond question, as recognized by us, and we consequently add *insulanus* Scudder and *insularum* Karny to the present synonymy.

Moreover, it is clear from the several hundred specimens of *triops* now before us, that this species develops several distinctive color phases, is very widely distributed through North

[24] Rehn and Hebard. Trans. Am. Ent. Soc., XL, p. 405, (1915).

America, northern South America, and the adjacent islands, and that this type does not divide into a multitude of closely related species, as has evidently been the opinion of many authors.

Chatham Island, February, 1906, 1 ♂.

Gryllidæ

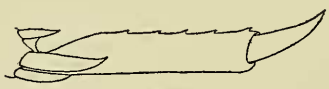
Four species of crickets are known from the Galapagos Islands. One of these is found almost everywhere over the American continent and adjacent islands. The other three are peculiar to the islands.

Myrmecophilinæ

25. **Cryptoptilum erraticum** (Scudder)

1893. *Cycloptilum erraticum* Scudder, Bull. Mus. Com. Zoöl., XXV, p. 23, pl. III, figs. 6 and 7. [♂; Charles Island, Galapagos Islands.]

7



8

Fig. 7.—*Cryptoptilum erraticum* (Scudder). Dorsal outline of male pronotum. Tagus Cove, Albemarle Island, Galapagos Islands. (X 6½)

Fig. 8.—*Cryptoptilum erraticum* (Scudder). Internal outline of caudal metatarsus and tibial and metatarsal spurs. Male. Tagus Cove, Albemarle Island, Galapagos Islands. (X 20)

1901. *Cycloptilum erraticum* McNeill, Proc. Wash. Acad. Sci., III, p. 505. [♂, ♀, juv.; Albemarle and Hood islands, Galapagos Islands.]

1901. *Cycloptilum lepismoide* McNeill, Proc. Wash. Acad. Sci., III, p. 505. (In part.) [♀; Abingdon Island, Galapagos Islands.]

A series of four males, two females and several immature individuals from the material recorded by McNeill, belonging to the Leland Stanford Jr. University, is before us.

Compared with the five other species previously assigned to *Cryptoptilum,* this species is found to be nearest *C. antillarum* Redtenbacher. The present is a more slender insect, with expansion of pronotum caudad not fully as decided, dorsal surface of abdomen scarcely darker than pronotum, widely spaced minute dark annuli of antennæ distinct, and female subgenital plate obtuse-angulate emarginate at an angle of slightly over ninety degrees.

In the more distinct antennal annuli, which in *antillarum* are subobsolete to obsolete, and the weaker emargination of the female subgenital plate, convergence toward *C. hesperum* Rehn and Hebard is indicated, the female subgenital plate in that species showing no emargination whatever.

The distribution of *antillarum* extends through the West Indies and southeastern United States, *hesperum* is known only from Lower California.

Individuals of the species of this genus are all heavily clothed with scales. These scales are very loosely attached, however, and frequent specimens are often taken which have lost a portion of this covering, while specimens which have been carelessly packed or placed in liquid preservative frequently lose practically their entire scale covering.

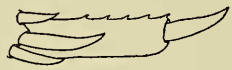
McNeill placed far too great importance on the apparent different degrees of scale covering in describing his *lepismoide* and referred the specimen of *erraticum* noted above to that species, apparently solely because it alone of the series of *erraticum* before him had retained an ample scale covering.

Length of body ♂ 7.8–8., ♀ 9.–9.8; length of pronotum ♂ 4., ♀ 2.3–2.7; greatest pronotal width ♂ 2.6, ♀ 2.2–2.6; length of caudal femur ♂ 4.8, ♀ 5.2–6.; length of ovipositor 4.8–5. mm.

26. Cryptoptilum lepismoide (McNeill)

1901. *Cycloptilum lepismoide* McNeill, Proc. Wash. Acad. Sci., III, p. 505. (In part[25].) [♂, ♀; Albemarle Island, Galapagos Islands.]

9



10

Fig. 9.—*Cryptoptilum lepismoide* (McNeill). Dorsal outline of male pronotum. *Type*. Tagus Cove, Albemarle Island, Galapagos Islands. (X 6½)

Fig. 10.—*Cryptoptilum lepismoide* (McNeill). Internal outline of caudal metatarsus and tibial and metatarsal spurs. Male. *Type*. Tagus Cove, Albemarle Island, Galapagos Islands. (X20)

A male at hand, taken at Tagus Cove on Albemarle Island, March 23, 1899, belonging to the Leland Stanford Jr. University, is here selected as type.

Two females, bearing the same data except that they were taken on February 4, 1899, are also before us. These specimens were apparently overlooked by McNeill. As this sex of the species has never been correctly recognized we would note that it differs from the female of *erraticum* only in its decidedly smaller size and subgenital plate which is less strongly emarginate meso-distad, forming there a strongly obtuse-angulation.

The male type shows that in this sex the pronotal expansion caudad is much weaker than in *erraticum,* approaching the condition found in the south Mexican *C. tubulatum* Rehn and Hebard, while the visible marginal portions of the tegmina are not darkened as in *erraticum.*

The maxillary palpi in this species have the fifth joint equal in length to the third, expanding evenly and weakly so that the greatest (distal) width is only two-fifths the greatest length, with apex weakly obliquely truncate.

[25] The female from Abingdon Island, described by McNeill as this species, represents an individual of *C. erraticum* (Scudder). It is probable that the immature examples recorded also represent that species.

Length of body ♂ 6.2, ♀ 6.5–6.8; length of pronotum ♂ 3.9, ♀ 1.9–2.; caudal width of pronotum ♂ 2.1, ♀ 2.–2.1; length of caudal femur ♂ 3.7, ♀ 4.–4.1; length of ovipositor 3.6–3.7 mm.

Gryllinæ

27. Hygronemobius speculi (McNeill)

1901. *Nemobius speculi* McNeill, Proc. Wash. Acad. Sci., III, p. 503, figs. 43 and 44. [2 ♂, 20 juv.; Tagus Cove on Albemarle Island, Galapagos Islands.]

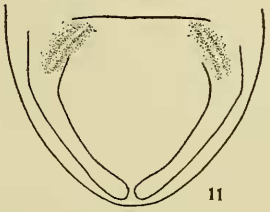


Fig. 11.—*Hygronemobius speculi* (McNeill). Dorsal outline of male subgenital plate and chitinous projections of titillator. *Type*. Tagus Cove, Albemarle Island, Galapagos Islands. (X 26)

Examination of the two adult males and twenty immature individuals of McNeill's series shows this species to be closely related to, but distinct from, *H. dissimilis* (Saussure). Our assignment of *speculi* to synonymy under *dissimilis*[26] is therefore erroneous.

We here select as type of *speculi* a male before us, belonging to the Leland Stanford Jr. University, taken at Tagus Cove on Albemarle Island, Galapagos Islands, on January 23, 1899.

Compared with males of *dissimilis* in the Philadelphia collections from Petropolis, Brazil, the following differences are noted. Maxillary palpi yellowish brown, with apex only of last joint suffused with a darker brown. Tegmina almost uniform dark brown, the veins and distal portion of the dorsal field being only very slightly paler[27]. Dorso-internal spur of caudal tibia equalling metatarsus in length. Titillator developed into two elongate slightly inbowed arms, the apices of which reach

[26] Ent. News, XXVI, p. 197, (1915).
[27] In the males of *dissimilis* before us the tegmina are as dark, with principal veins and broad caudal marginal portion of dorsal field strikingly buffy.

the apex of the subgenital plate and almost touch, thus enclosing an area roughly elongate-oval in shape[28].

28. **Gryllus assimilis** (Fabricius)

1775. [*Acheta*] *assimilis* Fabricius, Syst. Ent., p. 280. [Jamaica.]

1893. *Gryllus galapageius* Scudder, Bull, Mus. Comp. Zoöl., XXV, p. 22, pl. III, fig. 8. [♀, Albemarle Island; juv., Charles and Chatham islands; and all Galapagos Islands.]

The above synonymy was indicated by Rehn and Hebard at the time the genus, as found in America, was revised[29].

San Tomas, Albemarle Island, 1200 feet, October 30, 1905, 2 juv. ♂; Indefatigable Island, November 11 to 22, 1905, 1 juv. ♀; Chatham Island, October, 1905, 1 juv. ♂, 1 juv. ♀; Cormorant Bay, Charles Island, October, 1905, 1 ♀, 1 juv. ♂; and Hood Island, June, 1906, 2 juv. ♂, 1 juv. ♀.

---

[28] In *dissimilis* the titillator is on each side produced caudad in a straight, slenderly conical process, about twice as long as its basal width. The inner margins of these processes, and the distal margin of the titillator intervening approximately form a semicircle.

[29] Proc. Acad. Nat. Sci. Phila., 1915, p. 296, (1915).

1

7

2

8

9

6

10

3

4

5

11